F 9

```
LLL                 IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRRRRRRRRRRR
LLL                 IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRRRRRRRRRRR
LLL                 IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRRRRRRRRRRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR         RRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR         RRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR         RRR
LLL                    III        NNNNNN      NNN  KKK      KKK     EEE              RRR         RRR
LLL                    III        NNNNNN      NNN  KKK      KKK     EEE              RRR         RRR
LLL                    III        NNNNNN      NNN  KKK      KKK     EEE              RRR         RRR
LLL                    III        NNN   NNN   NNN  KKKKKKKKK        EEEEEEEEEEEE     RRRRRRRRRRRR
LLL                    III        NNN   NNN   NNN  KKKKKKKKK        EEEEEEEEEEEE     RRRRRRRRRRRR
LLL                    III        NNN   NNN   NNN  KKKKKKKKK        EEEEEEEEEEEE     RRRRRRRRRRRR
LLL                    III        NNN      NNNNNN  KKK      KKK     EEE              RRR   RRR
LLL                    III        NNN      NNNNNN  KKK      KKK     EEE              RRR   RRR
LLL                    III        NNN      NNNNNN  KKK      KKK     EEE              RRR   RRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR      RRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR      RRR
LLL                    III        NNN         NNN  KKK         KKK  EEE              RRR      RRR
LLLLLLLLLLLLLLL     IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRR         RRR
LLLLLLLLLLLLLLL     IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRR         RRR
LLLLLLLLLLLLLLL     IIIIIIIII     NNN         NNN  KKK         KKK  EEEEEEEEEEEEEEE  RRR         RRR
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FILEID**ISDSORT

```
            IIIIII      SSSSSSSS  DDDDDDDD      SSSSSSSS    OOOOOO    RRRRRRRR    TTTTTTTTTT
            IIIIII      SSSSSSSS  DDDDDDDD      SSSSSSSS    OOOOOO    RRRRRRRR    TTTTTTTTTT
              II      SS          DD      DD  SS          OO      OO  RR      RR      TT
              II      SS          DD      DD  SS          OO      OO  RR      RR      TT
              II      SS          DD      DD  SS          OO      OO  RR      RR      TT
              II      SS          DD      DD  SS          OO      OO  RR      RR      TT
              II        SSSSSS    DD      DD    SSSSSS    OO      OO  RRRRRRRR        TT
              II        SSSSSS    DD      DD    SSSSSS    OO      OO  RRRRRRRR        TT
              II              SS  DD      DD          SS  OO      OO  RR  RR          TT
              II              SS  DD      DD          SS  OO      OO  RR  RR          TT
              II              SS  DD      DD          SS  OO      OO  RR    RR        TT          ....
              II              SS  DD      DD          SS  OO      OO  RR    RR        TT          ....
            IIIIII    SSSSSSSS    DDDDDDDD    SSSSSSSS      OOOOOO    RR      RR      TT          ....
            IIIIII    SSSSSSSS    DDDDDDDD    SSSSSSSS      OOOOOO    RR      RR      TT          ....

          LL            IIIIII      SSSSSSSS
          LL            IIIIII      SSSSSSSS
          LL              II      SS
          LL              II      SS
          LL              II      SS
          LL              II      SS
          LL              II        SSSSSS
          LL              II        SSSSSS
          LL              II              SS
          LL              II              SS
          LL              II              SS
          LL              II              SS
          LLLLLLLLLL    IIIIII    SSSSSSSS
          LLLLLLLLLL    IIIIII    SSSSSSSS
```

```
0000            .title  ISDSORT Sort image section descriptors
0000            .ident  'V04-000'
0000    ;
0000    ;****************************************************************************
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0000    ;*                                                                          *
0000    ;*                                                                          *
0000    ;****************************************************************************
0000    ;
0000    ;++
0000    ;   FACILITY
0000    ;
0000    ;       Linker
0000    ;
0000    ;   ABSTRACT
0000    ;
0000    ;       Sort a list of isect descriptor addresses into virtual address order
0000    ;
0000    ;   ENVIRONMENT
0000    ;
0000    ;       Native mode, user mode
0000    ;
0000    ;   AUTHOR
0000    ;
0000    ;       Benn Schreiber, 17-Jan-1980
0000    ;
0000    ;   MODIFIED BY
0000    ;
0000    ;       V02-003         BLS0007         Benn Schreiber          15-Aug-1980
0000    ;               Convert to MDL data structures
0000    ;--
```

```
                                            0000            .sbttl  Declarations
                                            0000    ;
                                            0000    ;       Symbol defintions
                                            0000    ;
                                            0000
                                            0000            $isddef                                 ;define isect descriptor
                                            0000            $isldef                                 ;define isect list descriptor
                                            0000
                                        00000000            .psect  $code$,exe,nowrt
                                            0000
00000028 0000000D 00000004 00000001         0000    steps:  .long   1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 32767 ;Steps for shellsort
00000CD0 00000445 0000016C 00000079         0010
                  00007FFF 00002671         0020
                           0000000A         0028        numsteps = .-steps/4
                                            0028
                                            0028            .default displacement,word
```

```
                             0028            .sbttl  lnk$sortisects  sort image section descriptors
                             0028
                             0028    ;++
                             0028    ;
                             0028    ; Inputs:
                             0028    ;
                             0028    ;       4(ap)   number of entries in list
                             0028    ;       8(ap)   Address of list of isect descriptor addresses
                             0028    ;
                             0028    ; Outputs:
                             0028    ;
                             0028    ;       the list is sorted
                             0028    ;--
                             0028
                       07FC  0028            .entry  lnk$sortisects,^m<r2, r3, r4, r5, r6, r7, r8, r9, r10>
                             002A
                             002A    ;
                             002A    ; determine highest step to use
                             002A    ;
                  5A    D4   002A            clrl    r10                             ;index starts at 0
            50  04 AC   D0   002C            movl    4(ap),r0                        ;get number of keys
        50  D4 AF4A     D1   0030    10$:    cmpl    steps+8[r10],r0                 ;this step high enough?
                  09    18   0035            bgeq    20$                             ;if geq yes
    FFF3 5A   01  07    F1   0037            acbl    #<numsteps-3>,#1,r10,10$;no--look through all - 3
              5A  07    D0   003D            movl    #<numsteps-3>,r10               ;lots of symbols--use all steps
      7E  08 AC   04    C3   0040    20$:    subl3   #4,8(ap),-(sp)                  ;set table address-4 on stack
                  50    DD   0045            pushl   r0                              ;set # of entries on stack
              01  6E    D1   0047            cmpl    (sp),#1                         ;If there are not at least two entries
                  49    1B   004A            blequ   sort_exit                       ; then quit now
                             004C    ;
                             004C    ; now do the shell sort on the list.  The shell sort is described in
                             004C    ; Knuth Vol. 3 and is also referred to as the Diminishing Increment Sort.
                             004C    ;
                             004C    shell_sort:
        59  B0 AF4A     D0   004C    10$:    movl    steps[r10],r9                   ;get step value for this "t"
            58  01 A9   9E   0051            movab   1(r9),r8                        ;set up loop for step+1 to index
        56  04 BE48     D0   0055    20$:    movl    @4(sp)[r8],r6                   ;get address of key block for j'th key
        57  58    59    C3   005A            subl3   r9,r8,r7                        ;i=j-h
        54  04 BE47     D0   005E    30$:    movl    @4(sp)[r7],r4                   ;get address of key block for i'th key
            15    00    EF   0063    40$:    extzv   #isd$v_vpn,#isd$s_vpn,-  ;extract the vpn of the isect
            50  1C A4        0066                            isl$t_hdrisd+isd$l_vpnpfc(r4),r0
            15    00    ED   0069            cmpzv   #isd$v_vpn,#isd$s_vpn,-  ;and compare them
            50  1C A6        006C                            isl$t_hdrisd+isd$l_vpnpfc(r6),r0 ;and compare them
                  0B    1F   006F            blssu   60$
        50  59    57    C1   0071    50$:    addl3   r7,r9,r0                        ;compute i+h
         04 BE40  56    D0   0075            movl    r6,@4(sp)[r0]                   ;ids(i+h) = val
                  10    11   007A            brb     70$
        50  59    57    C1   007C    60$:    addl3   r7,r9,r0                        ;ids(i+h) = ids(i)
         04 BE40  54    D0   0080            movl    r4,@4(sp)[r0]
              57  59    C2   0085            subl2   r9,r7                           ;i=i-h
                  D4    14   0088            bgtr    30$
                  E5    11   008A            brb     50$                             ;go set ids(i+h)=val
    FFC3 58   01  6E    F1   008C    70$:    acbl    (sp),#1,r8,20$                  ;loop for all entries in table
              B7  5A    F4   0092    80$:    sobgeq  r10,10$                         ;loop for all steps
                             0095    sort_exit:
                        04   0095            ret
                             0096
```

```
0096   122         .END
```

```
                                                                M 15
ISDSORT                        Sort image section descriptors          15-SEP-1984 23:55:41  VAX/VMS Macro V04-00        Page   5
Symbol table                                                            5-SEP-1984 01:42:10  [LINKER.SRC]ISDSORT.MAR;1          (3)

ISD$L_VPNPFC                   = 00000004
ISD$S_VPN                      = 00000015
ISD$V_VPN                      = 00000000
ISL$B_NEWPRT                     00000016
ISL$C_SIZE                       00000018
ISL$K_SIZE                       00000018
ISL$L_BUFADR                     00000008
ISL$L_BUFDSC                     00000008
ISL$L_BUFEND                     0000000C
ISL$L_CLUDSC                     00000010
ISL$L_NXTISD                     00000000
ISL$L_PREVISD                    00000004
ISL$T_HDRISD                     00000018
ISL$W_FLAGS                      00000014
LNK$SORTISECTS                   00000028 RG      02
NUMSTEPS                       = 0000000A
SHELL_SORT                       0000004C R       02
SORT_EXIT                        00000095 R       02
STEPS                            00000000 R       02

                                              +-----------------+
                                              ! Psect synopsis !
                                              +-----------------+

PSECT name                     Allocation          PSECT No.  Attributes
----------                     ----------          ---------  ----------
.  ABS  .                      00000000  (     0.)  00 (   0.)  NOPIC    USR    CON    ABS    LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
$ABS$                          00000018  (    24.)  01 (   1.)  NOPIC    USR    CON    ABS    LCL NOSHR   EXE   RD     WRT NOVEC BYTE
$CODE$                         00000096  (   150.)  02 (   2.)  NOPIC    USR    CON    REL    LCL NOSHR   EXE   RD   NOWRT NOVEC BYTE

                                           +------------------------+
                                           ! Performance indicators !
                                           +------------------------+

Phase                     Page faults    CPU Time       Elapsed Time
-----                     -----------    --------       ------------
Initialization                     29    00:00:00.09    00:00:00.86
Command processing                129    00:00:00.74    00:00:04.51
Pass 1                            146    00:00:01.67    00:00:06.43
Symbol table sort                   0    00:00:00.06    00:00:00.06
Pass 2                             45    00:00:00.49    00:00:02.23
Symbol table output                 4    00:00:00.01    00:00:00.07
Psect synopsis output               1    00:00:00.01    00:00:00.05
Cross-reference output              0    00:00:00.00    00:00:00.00
Assembler run totals              356    00:00:03.07    00:00:14.21

The working set limit was 1200 pages.
6331 bytes (13 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 84 non-local and 10 local symbols.
122 source lines were read in Pass 1, producing 15 object records in Pass 2.
9 pages of virtual memory were used to define 8 macros.
```

```
                                            +--------------------------+
                                            ! Macro library statistics !
                                            +--------------------------+

Macro library name                           Macros defined
------------------                           --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         1
_$255$DUA28:[LINKER.OBJ]LNK.MLB;1                      1
_$255$DUA28:[SYSLIB]STARLET.MLB;2                      3
TOTALS (all libraries)                                 5

148 GETS were required to define 5 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:ISDSORT/OBJ=OBJ$:ISDSORT MSRC$:ISDSORT/UPDATE=(ENH$:ISDSORT)+LIB$:LNK/LIB+EXECML$/LIB
```

0215 AH-BT13A-SE
VAX/VMS V4.0

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LIS

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LIS

LINKER

STRTRIM
LIS

LINK
MAP

PREFIX
REQ

ISDSORT
LIS

STRUPCASE
LIS

STRTRANSL
LIS

DATBAS
MDL

TIRAUX
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